REMARKS

In view of the amendments above and remarks to follow, Claims 26-50, which are in the application, have been advanced to a condition for allowance.

OBJECTIONS

Claim 26 is objected. The rejection should be withdrawn in view of the modifications above and remarks below.

Claim 26 has been amended in light of the comments in the outstanding Office Actions. Reconsideration is requested.

REJECTIONS UNDER 35 USC 112

Claim 48 stands rejected under 35 USC 112, second paragraph. The rejection should be withdrawn in view of the modifications above and remarks below.

Claim 48 has been amended in light of the comments in the outstanding Office Actions. Reconsideration is requested.

REJECTIONS UNDER 35 USC 103

Claims 26-50 stand rejected under 35 USC 103(a) as unpatentable over Meadows in view of Beiswenger. The rejection should be withdrawn in view of the modifications above and remarks below.

It is well established that to establish a *prima facie* case of obviousness, the USPTO must satisfy all of the following requirements. First, the prior art relied upon, coupled with the knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or to combine references. *In re Fine*, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Second, the proposed modification must have had a reasonable expectation of success, as determined from the vantage point of one of ordinary skill in the art at the time the invention was made. *Amgen v. Chugai Pharmaceutical Co.* 18 USPQ 2d 1016, 1023 (Fed Cir, 1991), *cert. denied* 502 U.S. 856 (1991). Third, the prior art reference or combination of references must teach or suggest all of the limitations of the claims. *In re Wilson*, 165 USPQ 494, 496, (CCPA 1970). Meadows and Beiswenger et al, either alone or in combination teach or suggest all the limitations of the claims.

Third, the prior art reference or combination of references must teach or suggest all of the limitations of the claims. *In re Wilson*, 165 USPQ 494, 496,

(CCPA 1970).

Applicants' invention is related to a display device comprising:

(a) a transparent cover plate,

(b) a transparent support plate and at least one photodetector that is mounted on the support plate and that has a photosensitive solid angle range so that the support plate lies in the photosensitive solid angle range,

(c) an electrochromic cell or a liquid crystal cell located between the transparent cover plate and the transparent support plate,

(d) a radiation source radiation source arranged on at least one end face of the transparent cover plate so that light of the radiation source can enter and illuminate the cover plate, wherein the display device has a touch sensor.

Applicants' invention is directed to a display device and a novel touch sensor. "The display device with the touch sensor according to the invention consists of an electrochromatic call known pe se or a liquid crystal cell, which is located between two transparent plates, a transparent cover plate and a transparent support plate. A radiation light source whose light enters the cover plate and illuminates it is arranged at on at least one of the end faces of the transparent cover plate. At least one photodetector, in whose photosensitive solid angle range or all of the cover plate surface lies, is mounted on the support plate." (Specification, page 2, lines 16-23).

Applicants' invention includes the light source positioned to transmit light through edges of the panel and normally reemerges from the opposite edge due to the total reflection in the panel. When the finger touches the panel a portion of the light is coupled out at this touching point since the refractive index of the skin is higher than that of air. The coupled out light is scattered back by the finger. A portion of this light now passes through the cover panel and the entire display vertically to the surface. Beneath the base panel of the display a number of detectors are located with a narrow angle of incidence for light. If the light scattered by the finger falls on one of the detectors, the position of the finger is identified. Depending on the required resolution of the touching sensor a greater or smaller number of such detectors must be used.

The display device of Applicants' invention includes a "radiation source arranged on at least one end face of the transparent cover plate so that light of the

radiation source can enter and illuminate the cover plate." The novel arrangement directs light to pass through the transparent panel at an end face. A radiation source emits light that "enters the cover plate and illuminates it is arranged at on at least one of the end faces of the transparent cover plate" (Specification, page 2, lines 19-21).

The Office Action alleges that:

> As to claims 26 and 48, Meadows teaches a top glass plate fig 1(15) corresponding to transparent cover plate, a bottom glass plate Fig 1 (14) corresponding to a transparent support plate and a photodetector Fig. 1 (64) mounted on the bottom glass plate (see fig. 3) corresponding to at least one photodetector that is mounted on the support plate and that has a photosensitive solid angle range so that the support plate lies in the photosensitive solid angle range, a thin layer of conventional nematic-type liquid crystal material Fig. 1 (13) is sealed between the plates 14 and 15 in which includes an electrochromic cell or a liquid crystal cell corresponding to an electrochromic cell or a liquid crystal cell located between the transparent cover plate and the transparent support plate. Office Action (page 3, lines 4-13).

Meadows discloses a display in which:

> a projection-type LCD wherein a light source 40 is positioned behind the display panel 12 (i.e., beneath the display panel 12 as it appears in the figures). The light source 40 can be any suitable source of visible light and is shown in the figures in schematic fashion. The light source 40 is configured and arranged so that the light rays (shown as arrows 42) emanating therefrom strike the panel 12 between, but not including, the first column 54 and the last column 66 of pixels 28, and between, but not including, the first row 60 and the last row 72 of pixels 28. (Office Action, col. 3, line 63 to col. 4, line 5).

Further, Meadows teaches that:

> The light that is generated by the Y-emitter 52, and that passes through a pixel 28 in its path, is directed by mirrors to the Y-detector 64. In this regard, an elongated mirror, designated the left mirror 74, is mounted (for example, by attachment to an extension 76 of the LCD panel housing 78) to extend over the first column of pixels 54. The light directing surface of left mirror 74 is inclined to reflect across the display panel the light 53 that is generated by the Y-emitter 52 and that passes through a pixel 28 in the first column 54 of pixels. In this regard, the pixel through which the light passes has applied to it a potential difference suitable for permitting propagation of the light through the pixel at an intensity sufficient to

> be detected by the Y-detector 64. (Office Action, col. 4, lines 45 to 58).
>
> The light reflected by left mirror 74 strikes another mirror, designated the right mirror 80, which is mounted to extend over the last column 66 of pixels. The light directing surface of right mirror 80 is inclined to direct any light 53 striking it toward the last column 66 of pixels 28. The light 53 is directed substantially perpendicular to the plane of the display panel 12. Accordingly, the left mirror 74 and right mirror 80 define a particular optical path for the light 53 propagating between the pixels 28 in the first column 54 and the pixels in the last column 66. (Office Action, col. 4, line 65 to col. 7).

Thus, Meadows teaches a liquid crystal (LC) display in which the position of a finger or stylus can be identified by the fact that it is located at the point of intersection of two beams of light (Meadows, Figs. 2 and 3). For this purpose, light is for example emitted from 52, passed through the mirror 74 above the uppermost covering panel 15 of the display, through the air towards the mirror 80 and then back down again to the detector 64. This takes place in both surface directions x and y (the numbers in the transverse direction being: 58 -7 82 -7 84 -7 70). For the identification of the position, the light emitted from the linear light source 52 is passed sequentially through LC pixel 54 located on this edge and the light emitted from 58 is passed through pixels 60. If attenuated light impinges simultaneously on both detectors the two pixels 54 and 60 which have just allowed light to pass through indicate the coordinates of the finger or stylus.

The Office Action further alleges that:

> Meadows teaches all the claimed limitations as recited in claim 26 with the exception of providing a light source a radiation source radiation source arranged on at least one end face of the transparent cover plate. However, Beiswenger teaches a light source Fig. 2 (20) which passes through windows 24 of the liquid crystal display panel 22 forwardly, to be reflected 90 degrees by mirror portion 26.
>
> It would have been obvious to utilize the light source as taught by Beiswenger in the flat panel liquid crystal display disclosed by Meadows because this would provide between the liquid crystal panels for insertion of a finger or other opaque member to occlude at least one of the individual light beams." (Office Action, page 3, line 13 – page 4. line 2).

However Beiswenger et al does not teach or suggest Applicants' invention. Beiswenger et al teaches that the light (Fig. 2) is emitted from the source 20, via the mirror 26 and the window 28, via the display through the air and then through the

window 32 and the mirror 34 onto the detector. Fig. 8 illustrates a finger 49 that can interrupt the light originating from light sources 20b and 20 c and passed via mirrors and windows. Light attenuation is observed on the detectors 36. The position of the finger is identified from the coordinates of the windows 24b and 24c just opened, which is similar to Meadows.

Thus, neither Meadows nor Beiswenger et al teach or suggest a display device of Applicants' invention including "a radiation source radiation source arranged on at least one end face of the transparent cover plate so that light of the radiation source can enter and illuminate the cover plate, wherein the display device has a touch sensor." Rather, Meadows and Beiswenger et al, teach an arrangement that makes use of the shadow effect of the finger and not use of a refractive index.

In view of the above amendments, Applicants submit that the claims are in condition for allowance and the Examiner would be justified in allowing them.

Respectfully submitted,

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